WEST COAST FOREST HEALTH MONITORING
EVALUATION MONITORING PROJECT

Survey for Balsam Woolly Adelgid in Washington and Oregon

USDA United States Department of Agriculture

Forest Service

National Association of State Foresters

Balsam Woolly Adelgid

Balsam woolly adelgid (BWA) is an introduced insect that has had a significant impact on *Abies* tree species in the Pacific Northwest. During the late 1950s and 1960s, it caused extensive mortality of grand fir (*A. grandis*), subalpine fir (*A. lasiocarpa*), and silver fir (*A. amabilis*), particularly in the Cascade Range. This insect also affects tree growth and reproduction, potentially decreasing host regeneration and the role of the host tree in local ecosystems.

Adult BWA

Heavy stem infestation by BWA.

Branch gouting (swelling) caused by BWA.

OBJECTIVES

The purpose of this project was to:

- Conduct a ground survey of host type in Washington and Oregon to confirm the occurrence and distribution of BWA to supplement aerial survey detection.
- Determine the effects of BWA on host species and changes in local ecosystems from ground survey data and long-term plots.
- Determine if existing parameters for BWA occurrence and risk still describe the situation today.
- Explore opportunities for adapting the survey protocol for use in monitoring effects of other introduced species.

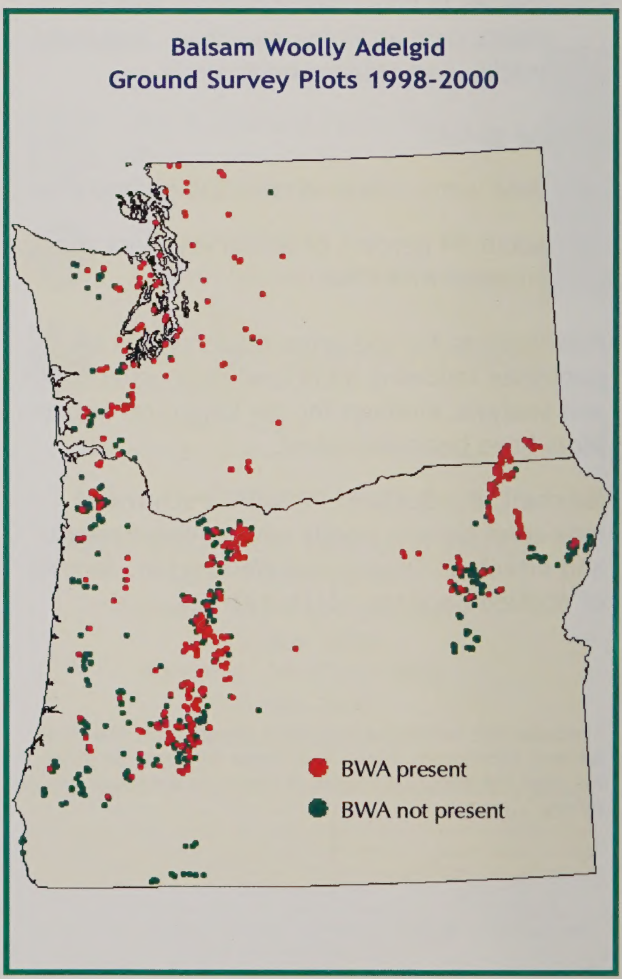
Mortality of subalpine fir by BWA.

Retired USDA Forest Service researcher Russ Mitchell examines fir for BWA on a long-term impact plot.

METHODS

In 1998, an occurrence/risk map was produced by using previous aerial survey data and research that described susceptible stand characteristics. Seven remaining long-term impact plots and photo points from the 1960s were relocated and remeasured or rephotographed.

From 1998 to 2000, a total of 1,038 ground survey plots throughout the host type were visited. The following data were collected on each plot: location, elevation, species, tree size, BWA symptoms, land use, tree structure, species contribution, and site description. Plot location was recorded in a geographic information system. Additional plots will be visited in subsequent years.



RESULTS

Long-Term Impact Plots:[1]

- Tree damage was most severe in the first decade of the BWA outbreak.
- The environment plays a significant role; higher mortality occurs on wet sites and at lower elevations.
- Host species have unique responses. Shasta (*A. magnifica*) and red fir (*A. procera*) have considerable resistance at high elevations; subalpine fir is susceptible at all locations.
- Grand fir is being eliminated from low-elevation landscapes in the Willamette Valley, the Puget Sound trough, and along coastal streams.
- Subalpine fir is being removed as a pioneer species in important mountain environments such as alpine meadows, avalanche tracks, and old lava beds.

Ground Survey:

- Data were collected on 1,038 ground plots.
- About 44 percent of all survey plots was infested with BWA.

Full findings for the ground survey will be published following additional data collection and analysis. Findings for the long-term impact plots have been published:

Mitchell, R.; Buffam, P. 2001. Patterns of long-term balsam woolly adelgid infestations and effects in Oregon and Washington. Journal of Applied Forestry. 16(3): 121-126.

[1] Because the number of long-term impact plots was small (seven), conclusions drawn from those data may be different from the eventual results of the more extensive ground survey.

1965

1998

Progression of BWA impacts on subalpine fir in a riparian area.

1968

TOP LEFT: First wave of BWA in 1965. ABOVE: Almost all subalpine fir killed by 1968. LEFT: Stand dominated by spruce, with no subalpine fir remaining in 1998.

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